Refer to: 65-51,249

8 June 1965

Electronics Research Center
575 Technology Square
Cambridge, Massachusetts 02139

Attn: Mr. Henry Maffeo

Subj: Contract NASw-963, Monthly Letter Report

Encl: Two (2) copies of subject report

Gentlemen:

The attached monthly letter report is provided and distribution has been made in accordance with Article X B of the subject contract.

If there are any questions, contact Mr. W. Woehler, Contracts Administrator, Mail Point 174 or Extensions 3159, 3221.

Very truly yours,

MARTIN-MARIETTA CORPORATION

Original signed by N. J. Schmidt

N. J. Schmidt
New Business Contracts Manager

/rh

cc: Capt. P. O'Connor
OBO (w/o encl)

Enclosure #1
Ltr. No. 56-51-249
65

Investigation of the Propagation of Millimeter and
Submillimeter Waves
Contract No. NASw - 963
Monthly Letter Report
Period: 1 May 1965 to 31 May 1965

During the report period, efforts were made to obtain higher harmonics from the Varian Klystron VC 714C, using the new multiplier and a 2 ft. absorption cell. Good power was obtained at 3rd harmonic (401 Gc) and during the next period an attempt will be made to utilize the 3rd harmonic in the interferometer.

A preliminary compilation was made of the absorption by H_2O vapor in the wings and it was found that some of the data requires the assumption that H_2O - H_2O collisions in the wing region are characterized by a very large collision cross-section ($\Delta\nu/p \approx 150$ MC/mm Hg) and efforts are now under way to obtain a direct measurement of this parameter which is required for exact atmospheric absorption observed by Tolbert and co-workers near the 118.7 Gc O_2 line. Measurements are now being made to determine whether this line is subject to any exceptional broadening by H_2O or CO_2. Since this line is due to a magnetic dipole, there is no reason to suppose that the electric dipole moment on H_2O or the quadrupole moment will actually lead to a substantial broadening and the requirements on stability in these measurements is, therefore, exceptionally severe.

The spectroscopic work in the absorption cell has been mainly concentrated on the NO_2 assymetric top molecule. Approximately 50 lines have been found in the region between 100 ang 300 Gc and assignment of hyperfine levels has been possible for several series of lines so far.

The spectroscopic work on H_2O and O_2 has been discontinued for the time being because there is hope of obtaining substantially higher power from new tubes and components now under test. The availability of higher power will greatly facilitate these efforts.

182.1 manhours worked during this period.

Vernon E. Derr
Vernon E. Derr
Principal Researcher

H. Ryan, Manager
Physical Sciences Laboratory

VED/jf